

ical Economy in Part II. of the Moral Sciences Tripos. The first award is to be in June 1887. He desires to concentrate the attention of some students more systematically than hitherto, noting that on some sides Natural Science studies constitute the best preparation.

During the last ten years, grants from the Worts Fund for Antiquarian and Literary subjects have amounted to 1100'; for Biological and Geological subjects, to 1225'; and for Medical subjects, to 1007.

Sir J. Lubbock's Rede Lecture will be delivered on Wednesday, June 9, at 2 p.m., in the Senate House, subject, "On the Forms of Seedlings and the Causes to which they are due."

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 27.—"The Influence of Stress and Strain on the Physical Properties of Matter. Part I. Elasticity (continued). The Effect of Magnetisation on the Elasticity and the Internal Friction of Metals." By Herbert Tomlinson, B.A. Communicated by Prof. W. Gylls Adams, M.A., F.R.S.

The principal object of this investigation was to test the soundness of the view advanced by Prof. G. Wiedemann respecting the cause of the internal friction of a torsionally oscillating wire. According to this view, the internal friction is mainly due to permanent rotation to-and-fro of the molecules about their axes; it seemed probable, therefore, that experiments on the effects of magnetising a wire, either longitudinally with a helix, or circularly by passing a current through it, would aid in elucidating the matter.

The following are the principal results which have been obtained:—

(1) When the deformations produced by the oscillations are small, the internal friction of a torsionally vibrating wire of iron or steel is not affected by sustained longitudinal magnetisation of moderate amount. The internal friction is also not affected by the sustained magnetisation even when the latter is carried to the point of saturation, provided the magnetising current be, previously to experimenting, reversed a great number of times. When no previous reversals have been made, the internal friction is slightly increased by intense magnetisation.

(2) When the deformations produced by the oscillations are large, the internal friction is very sensibly increased by sustained longitudinal magnetisation of large amount.

(3) The torsional elasticity is entirely independent of any sustained longitudinally magnetising stress which may be acting upon an iron or steel wire, provided the deformations produced by the torsional oscillations be small. When the deformations are large, the number of oscillations executed in a given time is very slightly lessened by sustained longitudinal magnetisation of large amount.

(4) When the magnetising current is interrupted and, to a greater extent, when it is reversed repeatedly whilst the wire is oscillating, the internal friction is increased, provided the magnetising stress be of moderate amount. The increase of internal friction may become very considerable when the magnetising stress is great.

When the number of interruptions or reversals in a given time of the magnetising current exceeds a certain limit, the effect on the internal friction begins to decline.

(5) When the deformations produced by the oscillations are small, the torsional elasticity is not affected by either repeatedly interrupted or reversed longitudinal magnetisation even when the magnetising stress is large.

(6) There exists a limit of magnetic stress within which no permanent rotation whatever of the molecules is produced. This limit may be widened by previous repeated reversals of a large magnetising stress.

(7) The passage of a moderate electric current, whether sustained or interrupted, through a torsionally vibrating wire of iron, steel, or nickel does not affect, except by heating, either the internal friction or the torsional elasticity, provided the deformations produced by the oscillations be small.

(8) The effect of longitudinal magnetisation, even when carried to the point of saturation, on the longitudinal oscillation of an iron or steel wire, is *nil*.

(9) The passage of an electric current, whether sustained or interrupted, through a longitudinally oscillating wire of iron or steel does not, except by heating, affect the number of oscillations executed in a given time.

Chemical Society, May 6.—Dr. Hugo Müller, F.R.S., President, in the chair.—Messrs. John W. King, William Herbert Hyatt, and George T. Holloway were admitted Fellows of the Society.—The following papers were read:—Paranitrobenzoylactic acid and some of its derivatives, by Dr. W. H. Perkin, jun., and Dr. E. Bellinot.—An acetic ferment which forms cellulose, by Adrian J. Brown.

Victoria Institute, May 28.—Annual Meeting.—The chair being taken by Prof. Stokes, P.R.S., Capt. Francis Petrie, as Honorary Secretary, read the report, which showed that the home, colonial, and American members were now upwards of 1150, and an increasing number of leading men of science had contributed to its transactions, and the Institute was much indebted to many other scientific men of eminence, at present outside its ranks, who had kindly given their aid and advice, so that the Institute might the more worthily foster a true appreciation of the results of scientific inquiry.—Prof. Hull, F.R.S., Director of the Geological Survey of Ireland, delivered the address, in which he gave an account of the work, discoveries, and general results of the recent Geological and Geographical Expedition to Arabia and Western Palestine, of which he had charge. Prof. Hull, having sketched the course taken by the scientific Expedition (which to a considerable extent took the route ascribed to the Israelites), the physical features of the country, evidences of raised beaches, &c., showed that at one time an arm of the Mediterranean had occupied the valley of the Nile as far as the First Cataract, the level of the land being 200 feet lower than at present (an opinion which had also been arrived at by another of the Institute's members, Sir W. Dawson), and that, at the time of the Exodus, the Red Sea ran up into the Bitter Lakes, and clearly must have formed a barrier to the travellers' progress at that time; he then alluded to the great changes of elevation in the land eastward of these lakes, mentioning that the waters of the Jordan valley once stood 1300 feet above their present height. The various geological and geographical features of the country were so described as to make the address a condensed report of all that is now known of that part of the East.—A vote of thanks was accorded to Dr. Hull, after which the members and their guests adjourned to the museum, where refreshments were served.

EDINBURGH

Mathematical Society, May 14.—Dr. R. M. Ferguson, President, in the chair.—Mr. J. S. Mackay gave a construction, due to the Right Hon. H. C. E. Childers, for solving the problem of medial section; Mr. W. Peddie read the second part of a paper on the theory of contour lines and its application to physical science; and Mr. A. Y. Fraser submitted a paper, by Mr. Charles Chree, on the vibrations of a spherical or cylindrical body surrounded by or containing fluid.

PARIS

Academy of Sciences, May 24.—M. Jurien de la Gravière, President, in the chair.—Order of appearance of the first vessels in the leaves of the Cruciferae: mixed formation (part 5), by M. A. Trécul. In a previous paper the author showed that the primary lobes in the type of mixed formation presented by certain Cruciferae appear on either side of the young leaves in two superimposed series—a lower *bisipetal* and an upper *basifugal*. He now proves that the first vessels of the nervous system corresponding to these lobes usually appear in the same order. Those opposed to the lobes of the basifugal series follow from below upwards, while those opposed to the lobes of the bisipetal series make their appearance successively from above downwards.—A study of the movements communicated to the air by the action of a bird's wing: M. Müller's experiments, by M. Marey. A description is given of M. Müller's mechanical experiments, which are conducted at night by the aid of phosphorescent vapours, and during the day by means of smoke in the way adopted by Tyndall.—Note accompanying the presentation of M. Verbeek's fresh studies on the Krakatōa eruption, by M. Daubrée. Besides a detailed account of the eruption this comprehensive work contains a full description of the meteorological and magnetic phenomena attending it, together with some theoretical considerations on their causes. The author calculates that the quantity of matter ejected was at least 18 cubic kilometres in volume, all incoherent, consequently unaccompanied by any flow of lava.—Presentation of various maps of France, Algeria, Tunisia, and Africa, issued by the Geo-

graphical Service of the Army, by M. Perrier. Amongst these maps are one of France, scale 1:200,000, comprising the districts of Amiens, Melun, Lille, Mézières; one of Algeria, part 6, scale 1:50,000, districts of Azeffun, Jebel-Filfila, Jemmapes, Ben-Harun, Aine-Bessem, Rio Salado; and one of Tunisia, scale 1:200,000, districts of Nefta, Rejem-Matong, Dwirat, Wed-Fessi.—Note on a new form of purulent infection following an acute attack of pneumonia, by M. Jaccoud.—Researches on the organisation of the star-fish, by M. Edm. Perrier. Amongst the collections brought back by the Cape Horn Mission were several specimens of a new species of star-fish (*Asterias hyadesi*, E. P.), with their young still attached, a circumstance which has helped to throw fresh light on some disputed points connected with the anatomical structure of these animals.—Observations of the new comets 1886 *a* (Brooks I.) and 1886 *b* (Brooks II.) made at the Observatory of Nice (Gautier equatorial), by M. Charlois.—On the geography of the Central Tunisian seaboard, by M. Rouire. A careful survey of the section of the coast between Hammamet and Susa has determined the existence of a large marine inlet at the head of Hammamet Bay, which receives all the drainage of Central Tunisia. It was also ascertained that at some more or less remote period the Halk-el-Mengel Sebkhah was certainly navigable.—Determination of the absolute value of the wavelength of the ray D_{β} , by M. J. Macé de Lépinay. A fresh attempt to settle this disputed point gives the general result—

$$5.8917 \times 10^{-5} \text{ (millilitre)}^{\frac{1}{2}};$$

and in the air, at 0°, normal pressure—

$$5.8900 \times 10^{-5} \text{ (millilitre)}^{\frac{1}{2}}.$$

—On a visual illusion: apparent motion of a small object when slightly illumined amid the surrounding darkness, by M. Aug. Charpentier.—A new electric fuse for exploding mines charged with powder or dynamite, by MM. Scola and Ruggieri. For this fuse the authors claim that it prevents all accidents from slow combustion, and also removes some other dangers and difficulties attending mining operations.—Note on an apparatus intended to test the efficacy, or ascertain defects in the preparation, of electric fuses, by M. Ducretet.—Description of the cyclone that swept over Madrid on May 12, by M. A. F. Nogués.—On two different conditions of the black oxide of copper, by M. Joannis.—Action of the air, silica, and kaolin on the alkaline haloid salts: new methods of preparing hydrochloric acid, chlorine, and iodine, by M. Alex. Gorgeu.—On the oxidation of oils, by M. Ach. Livache.—On a little-known cause of corrosion in steam-boilers, by MM. D. Klein and A. Berg.—On a new means of employing the iodo-ioduretted reaction in the research of the alkaloids, and especially of the leucomaines in urine, by MM. Chibret and Izarn.—A fresh study of *Entomiscus* (*E. kossmanni*, *E. fraissi*, *E. moniezii*), by MM. A. Giard and J. Bonnier.—On the embryogeny of *Comatula* (*C. mediterranea*), by M. J. Barrois.—Observations regarding the nervous system and certain organic features of the scutibranch gastropods, by M. E. L. Bouvier.—On a new *Ichthyobdella*, by M. R. Saint Loup. This species, which the author describes under the name of *Scorpenobdella elegans*, was recently observed in the Marine Zoological Laboratory at Marseilles.—On the superficial vascular apparatus of fishes, by M. P. de Sède.—On a fungus developed in the human saliva, by M. Galippe. This fungus, discovered in some saliva filtered by Pasteur's apparatus, and cultivated in Van Tieghem's cellulose, belongs to the family of the Monilia. The author proposes to name it *Monilia sputicola* (sp.n.).—Remarks on the fifth volume of M. Habich's *Anales de Construcciones civiles y de Minas*, presented to the Academy, by M. Daubrée. To this volume M. Chalon contributes a paper on the prehistoric monuments of Peru, which show a remarkable resemblance to the menhirs, cromlechs, dolmens, and other "Druidical" remains in the west of Europe. They occur in large numbers in every part of the country.—At the request of M. de Lesseps, the President appointed a Commission comprising the members of the Sections for Geography, Navigation, and Astronomy, with MM. Daubrée, Favé, Lalanne, and de Jonquières to study the differences of level caused by the tides in the Pacific and Atlantic Oceans.

STOCKHOLM

Academy of Sciences, April 14.—On the results of some experiments on the condition of electricity in a vacuum, by Prof. E. Edlund.—On the power and fineness of the hollow muscles of the frog, by Herr C. G. Santesson.—On the oxidation of cymal,

and on nitrocymal, by Prof. O. Widman and Dr. J. O. Bladin.—Mineralogical notes, by Dr. G. Flink.—Some remarks on the geological map of Sweden, by Herr E. Törnebohm.—Determination of the definite elements of the orbit of the Comet VIII. (1881), by Dr. K. G. Olsson.—Micrometrical determinations of some telescopic star clusters, by Prof. H. Schultz.—Contributions to the theory of wave-motions in a gaseous medium, by Prof. A. V. Bäcklund.—On the integration of the differential equation in the problem of N bodies, by Prof. G. Dillner.

May 12.—On a new method for determining the velocity of the electric molecules in a current of a certain power, by Prof. Edlund.—Contributions to the knowledge of the discharge of the Ruhmkorff coil, by Hr. T. Moll.—A method for increasing the convergence of periodical series, by Hr. C. Charlier.—Research on a non-linear differential equation of the second order, by Prof. H. Gylden.—An account of the Zoological Station of Christneberg, in the province of Bohus, belonging to the Academy, by Prof. Sven Lovén.—Researches on the changes of the arsenious oxide in contact with putrid animal matters, by Prof. Hamberg.—A balance constructed by Hr. F. J. Lemcke for determining the consumption of the normal light in the measurement of the power of the light, exhibited by Prof. F. L. Ekman.—New or imperfectly known Isopoda, part 3, by Dr. C. Bavallius.—On naphthoic acids, by Dr. Ekstrand.

BOOKS AND PAMPHLETS RECEIVED

"Ling-Nam," by B. C. Henry (Partridge).—"Infant School Management," by S. S. Hale (Stanford).—"The Romance of Mathematics," by P. Hampson (E. Stock).—"Handy Guide to Norway," by T. B. Willson (Stanford).—"Chemical Arithmetic," by J. M. Coit (Heath, Boston).—"Summary Report of the Operations of the Geological and Natural History Survey of Canada," part 3 (Maclean, Ottawa).—"Earthquakes of Ischia," by H. J. Johnston-Lavis (Dulau).—"La Mythologie," by A. Lang; traduit de l'Anglais par Léon Parmentier (A. Dupret).—"Determination of Rock-forming Minerals," by Dr. E. Hussack, translated by Dr. E. J. Smith (Wiley, New York).—"Studies from the Biological Observatory, Johns Hopkins University," vol. iii. No. 6.—"Catalogue No. 10 of Physical Apparatus for Universities and Superior Schools" (F. Encke, Berlin).—"Account of the Graphic Method in Use for Determining the Co-ordinates of the Secondary Trigonometrical Stations of the Ordnance Survey," by J. O. Farrell (Byre and Spottiswoode).—"Modern Armour for National Defence," 2nd edition, by W. H. Jacques.—"Ericsson's Destroyer and Submarine Gun," by W. H. Jacques.—"Heavy Ordnance and National Defence," by W. H. Jacques (Putnam, New York).—"Circulars of Information of the Bureau of Education," No. 4, 1885: Education in Japan (Washington).—"John Bunyan and the Gipsies," by J. Simson (MacLachlan, Edinburgh).

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